Science and Television

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Educational television, since its beginnings more than 10 years ago, has often borne the critical burden of being described as little more than "illustrated radio." Time and time again, distinguished scholars and scientists have come before the cameras to talk, to tell, sometimes to show, but seldom to utilize television to its full potential. Although the power of good talk and personality on TV should not be underestimated, even for a moment, the program that has only incidental visual support is certainly one of the most conspicuous and continuing failures of educational television. Occasional series or individual programs have broken through the limitations of our verbally oriented culture, but they have been rare.

Focus on Behavior, a series of ten 30-minute films produced for National Educational Television under the auspices of the American Psychological Association, is one of these unusual events. These films show experimental psychologists and the nature of the work they are doing in studying behavior. The programs are filmed on location; the "sets" are the laboratories; the "actors" are the psychologists and their experimental subjects. The programs make an obvious break with the talk tradition so common on educational television. Thus, the manner in which the films are presented is almost as interesting as the content itself.

The major characteristic of the series is the consistent presentation of experimental psychology by showing people doing things rather than by *telling* what has been done, giving conclusions, and then illustrating these through supporting visual demonstrations or examples. The experimental situation is the keynote, and enough of it is shown to give the viewer some feeling about how psychologists obtain their data as well as some indication of the nature of the data itself.

The viewer enters the realm of experimental psychology by actually witnessing situations in which subjects (both human and animal) respond to test problems or laboratory manipulation. Some of the encounters are dramatized for obvious reasons, but with an integrity and honesty that has no sense of falseness or play-making whatsoever. As such, the films have a fascination reminiscent of *Candid Camera* or *Wild Kingdom* but, of course, with considerably more depth and significance.

Another important characteristic of the series is that some of the programs present information in a way that allows the viewer to see evidence and data being collected, to watch the unfolding chain of information and relationships, and then to draw some conclusions for himself. This presentation avoids a situation that is anathema to me and one that is far too common in most educational television and films today—the sin of giving conclusions and examples without allowing the viewer to participate in any sort of intellectual process on his own.

Within this series of films, the extent to which this is brought off varies greatly. Among these films the first one, *The Conscience of a Child,* which reports on studies carried out at Stanford University by Robert R. Sears, is best. The viewer sees an almost artistic unfolding of how Sears thinks the conscience of a child may develop, presented not in the form of a lecture, but in scenes which show children interacting in structured test situations that will help answer the question, "How do children develop conscience?" In short, the film does not begin with a conclusion but with a question that the experimental evidence presented will help to answer. And, at the end of the film, when John Darley, the moderator, helps the viewer to sum up and generalize a bit, the thoughtful watcher has probably already done much for himself. He feels that he has learned, has understood, and has seen how theories grow and are put to the test.

Darley, professor of psychology and chairman of the Department of Psychology at the University of Minnesota, is the host and moderator for the entire series. His contribution is excellent in that he uses few and significant words, keeps a low and easy key in opening and closing the films, and lets the viewer retain some part in arriving at understanding.

The second program, *A World to Perceive*, also gives an entertaining and rich insight into the ways psychologists study how man perceives and comes to perceive his world. Excellent film is shown of the "visual cliff" experiments carried out by Eleanor Gibson (Cornell University) and Richard Walk (George Washington University) with animals and children; the presentation is long enough and in enough detail to promote some involvement and comprehension on the part of the viewer. The detail with which the studies of Herman Witkin (State University of New York), on the perception of the upright, are filmed is so realistic that the viewer feels that he himself has shared the tilting chair with the subject and has tried to realign himself with the distorted visual field.

The Social Animal, the seventh program, is also successful in its use of this step-by-step presentation of evidence. One watches intently as a group gradually turns against a nonconforming member who consistently refuses to yield his point of view and go along with the majority. Significantly, the research is not described, or alluded to, or presented graphically. It is portrayed through seeing the real situation, sometimes with the unfinished feeling of the actual. And, although the situations must be well planned and in some instances highly controlled, such film does succeed in getting the experimental situation much closer to the layman than is usual.

But showing the laboratory situation, the real thing, is not the only aspect of successful treatment. There is also the subtle effect of organization, of how questions are framed and delimited for answering. For example, a great deal of film that treats the laboratory situation is shown in the fourth program, *The Chemistry of Behavior*, but the film seems too broad and hazy in context. One witnesses animals and people responding in dramatic ways to drugs. However, the emphasis is always on the behavior, and one

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must accept the word of the experimenter that such and such a chemical is responsible for the change. When the film is concluded, the viewer can really say no more than that drugs change the behavior of people and animals, a rather obvious conclusion after such an elaborate treatment. In this case, it seems that much more would have been gained by limiting concern to one kind or sort of question, by following the problems and techniques of research in more detail, and perhaps even by relating the question to the "chemistry" as well as the "behavior."

The Brain and Behavior, the third program, has a fascinating succession of film and also raises a very significant question: "Is all science appropriate for showing in the home to laymen?" The film includes a great deal of footage of "the cat in the hat," a cat with a cumbersome instrument on the top of its head, which connects to electrodes inserted into specific areas of the brain. And one watches such examples as a hungry cat, stimulated in the area that controls sleep, abandoning its activity and curling up to sleep.

As fascinating as the implications of such research are, I feel that, in this instance, where film so powerfully depicts reality, certain aspects of experimentation should be played down if not omitted. I am not raising the question of whether animals should be used in experimentation. That must be clearly separated from what I am questioning—how and in what detail should animal experimentation be filmed for general viewing in the home by all of the family.

Some people may take exception to the subtitle of the series, "The science of psychology," and to such references in various programs as "the science of learning." In fact, one program (*No Two Alike*) uses the word *science* six times in relation to some aspect of psychology. The process, activities, and contributions to the understanding of behavior guarantee to psychology its place as a science, and the films reveal this with insight and skill. Hence it is redundant to speak of the science of psychology just as it would be redundant, if not pompous, for physics to keep referring to itself as "the science of physics" or for chemistry to speak of "the science of chemistry" or of "the science of free radicals."

Regardless of my criticisms of individual films, the series represents a major step forward in the presentation of science. *Focus on Behavior* has managed to combine the tremendous appeal existent in the fact that psychology is about ourselves, our children, and animals, with techniques of presentation that are far better than those generally seen on television.

It would be convenient if one could credit a single individual with the authorship. However, as is usual in television, the responsibility for the success of the series is distributed among a wide number of people. These include the American Psychological Association (the Board of Scientific Affairs, the Board of Directors, and a special advisory committee for the program), Mayer-Sklar Inc., which produced the series (credits include almost 20 producers, writers, and directors), and last but not least, the large number of psychologists who participated in the programs (more than 25 are named in the series summary).

The individual titles and the areas covered by the ten films are: *The Conscience of a Child* (growth and development), *A World to Perceive* (perception), *The Brain and Behavior* (brain and the nervous system), *The Chemistry of Behavior* (psychopharmacology), *Learning about Learning* (learning research), *No Two Alike* (individual differences and psychological testing), *The Social Animal* (social psychology), *The Need to Achieve* (motivation and personality), *Of Men and Machines* (engineering psychology), and *Computers and Human Behavior* (computers and human mental processes). These films are available for purchase or rental through the Audio-Visual Center (Indiana University, Bloomington. $150 each). A descriptive folder and study guides for the series are available from National Educational Television (10 Columbus Circle, New York, N.Y. 10019).

A final note on reviewing film is appropriate at this point. This is the second time that an educational TV series has been reviewed in *Science* [see Garrett Hardin's review of *Virus,* in *Science* **134**, 548 (25 Aug. 1961)]. Although many would probably agree that more such series should be reviewed, the difficulty of the undertaking must not be underestimated. Reviewing films requires equipment for projection, time for securing and returning films, and time to set up the film, view it, and rewind it. Each film should be viewed at least twice, and a number of films must be checked later to ascertain the accuracy of comments one wishes to make about them. This particular series of ten 30-minute films required a great deal of time for viewing, plus several additional hours for checking. And all of this was preliminary to the actual time required to write the review.

Thus it can be seen that we ask a great deal of film reviewers. Yet we must keep in mind the impact that these films and others like them can have. They will be shown on more than 80 educational TV stations in the United States, probably in many cases more than once. In addition, they will be distributed to schools and colleges where they will probably reach an audience at least as large as the TV audience.

In his review Garrett Hardin commented on the need for laboratory workers to get out of their labs and tell the rest of the world what they have been doing. As this is increasingly done through the medium of television, we concurrently need reviewers to comment on how well and how accurately the story is being told.

X-Rays: A Scientific Tool

X-Ray Studies of Materials. A. Guinier and D. L. Dexter. Interscience (Wiley), New York, 1963. x + 156 pp. Illus. $6.95.

X-Ray Studies of Materials, by Guinier and Dexter, is the 20th volume in that excellent series, the Interscience Tracts on Physics and Astronomy, edited by R. E. Marshak. The present volume is a survey of the uses of x-rays as a scientific tool. Medical applications and industrial radiography are omitted.

The first five chapters review the fundamentals of x-ray production and detection and the standard theory of diffraction by perfect and mosaic crystals. The level of treatment is appropriate for a beginning physics graduate student, the detail and emphasis for the interested nonspecialist.

Chapter 6, on the determination of atomic arrangements, does not quite do justice to the achievements of modern crystallography. No mention is made of the spectacular work on myoglobin and hemoglobin, nor is there sufficient emphasis of the revolution that high-speed computers have brought about.

Chapters 7 and 8 are the best, and